

# **Introduction to IndianaMap Resources and LiDAR**

**Phil Worrall, Executive Director Indiana  
Geographic Information Council (IGIC)**

[www.igic.org](http://www.igic.org) & [www.indianamap.org](http://www.indianamap.org)



# **Introduction to IndianaMap Resources and LiDAR**

## **The IndianaMap is...**

Indiana's largest publicly available collection of  
Geographic Information System (GIS) Data.



# IndianaMap.org Web Site



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**Geoprocessing operations**

- Run tools to execute geoprocessing operations
  - Buffer, Clip, AddField
- Set environments
  - Workspace, Coordinate System, Cell Size
- Functions for helping workflows
  - ListFields, ListLayers, Describe, SearchCursor
- Classes for complex objects
  - SpatialReference, Map
- Modules that provide additional functionality
  - arcpy.mp (managing map documents)
  - arcpy.sa (spatial analyst tools)
  - arcpy.gd (geoprocessing data)

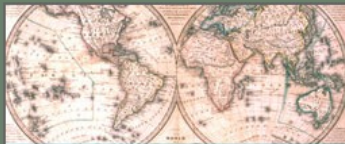
**NEW & Updated Layers**

- ▶ Updates for Five Layers added to the Map
- ▶ Four IndianaMap Data Sharing Initiative Layers Updated
- ▶ Four IDNR Layers Updated
- ▶ Four IndianaMAP Data Sharing Initiative Layers Updated

**IndianaMap News**

- ▶ Three Layers Removed from IndianaMap
- ▶ Institutional Control Sites (IDEM) Layer Updated
- ▶ Explore the New IndianaMap Layer Gallery
- ▶ Custom Printing Added to the Map

GIS Conference 2012  
Bloomington, Indiana



[View the Map](#)



[Data and Resources](#)



[Initiatives](#)



[Partners](#)

## Welcome to IndianaMap

IndianaMAP is the largest publicly available collection of Indiana geographic information system (GIS) map data. It is made possible by an alliance of partners from federal, state, local organizations and agencies, and universities. You can:

## Important Links

- ▶ [Indiana Geological Survey](#)
- ▶ [Indiana Spatial Data Portal](#)
- ▶ [Indiana Geographic Information Council](#)

# Over 260 Layers on the IndianaMap from over 25 Data Contributors

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Indiana Department of Transportation (INDOT) – 14 layers  
Indiana Department of Natural Resources (IDNR) – 9 layers  
Indiana Department of Environmental Management (IDEM) – 22 layers  
Indiana Office of Technology (IOT) – Geographic Information Office (GIO) – 5 layers  
Indiana Geological Survey (IGS) – 63 layers  
Indiana Department of Commerce – 4 layers  
Indianapolis Mapping and Geographic Infrastructure System (IMAGIS) – 1 layer  
Indiana Geographic Information Council (IGIC) – 3 layers  
Indiana Business Research Center (IBRC) – 2 layers  
Indiana Election Division – 2 layers  
Indiana Utility Regulatory Commission (IURC) – 1 layer  
Federal Emergency Management Agency (FEMA) – 4 layers  
National Oceanic and Atmospheric Administration (NOAA) – 2 layers  
National Park Service (NPS) – 2 layers  
National Resource Commission (NRC) – 1 layer  
U.S. Census Bureau (USCB) – 23 layers  
U.S. Environmental Protection Agency (EPA) – 5 layers  
U.S. Geological Survey (USGS) – 23 layers  
U.S. Department of Agriculture (USDA) – 15 layers  
Bureau of Transportation Statistics (BTS) – 6 layers  
U.S. Fish and Wildlife Service (USFWS) – 4 layers  
U.S. Forest Service (USFS) – 2 layers  
Federal Communications Commission (FCC) – 1 layer  
Bernardin, Lochmueller, and Associates, Inc. – 4 layers  
Environmental Systems Research Incorporated (ESRI) – 1 layer

# IndianaMap Viewer – Layer Gallery



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[Map Gallery](#)

[Layer Gallery](#)

[Demographics](#)

[Environment](#)

[Geology](#)

[Government](#)

[Hydrology](#)

[Imagery](#)

[Infrastructure](#)

[Reference](#)

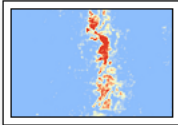
[My Layers \(4\)](#)

## Hydrology » Karst

- [Aquifers](#)
- [Canals](#)
- [Floodplains](#)
- [Hydrogeologic](#)
- [Karst](#)
- [Monitoring](#)
- [Water Bodies](#)
- [Water Quality](#)
- [Water Wells](#)
- [Watersheds](#)
- [Wetlands](#)

[Explore All](#)

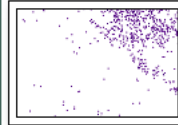
### Sinkhole Density (2011)



Sinkhole Density (2011), (30-meter TIFF Image) - Shows the density of sinkholes per square kilometer in southern Indiana and Kentucky. It was created by the Indiana Geological Survey to support a statistical regression analysis of potential sinkhole development areas in

[Preview](#) [Metadata](#) [Download](#) [Map Service](#) [Add Layer](#)

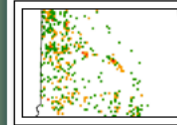
### Sinkhole Inventory (2011)



Sinkhole Inventory for southern Indiana and northern Kentucky. The Indiana Geological Survey conducted a statistical regression analysis of potential sinkhole development areas in and around the

[Preview](#) [Metadata](#) [Download](#) [Map Service](#) [Add Layer](#)

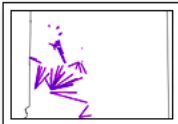
### Cave Density



Cave Entrances per Square Kilometer, 1997 - Shows the density (i.e., number of entrances per square kilometer) of mapped cave entrances in Silurian, Devonian, and Mississippian rocks in southern Indiana. Locations of individual cave entrances are not shown. The

[Preview](#) [Metadata](#) [Download](#) [Map Service](#) [Add Layer](#)

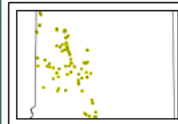
### Dye Lines



Inferred Connections for Selected Subsurface Dye Traces, 1999 (1:24,000) - Shows inferred subsurface connections between input and detection points of various dye-trace investigations in southern Indiana. This shapefile should be used in conjunction

[Preview](#) [Metadata](#) [Download](#) [Map Service](#) [Add Layer](#)

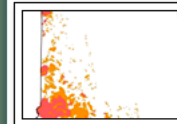
### Dye Points



Input and Detection Points for Selected Subsurface Dye Traces, 1999 (1:24,000) - Shows the locations of input and detection points that were used for selected subsurface dye-trace investigations in southern Indiana. This shapefile should be used in conjunction

[Preview](#) [Metadata](#) [Download](#) [Map Service](#) [Add Layer](#)

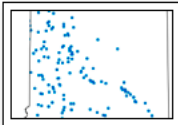
### Sinkhole Areas and Sinking-Stream Basins



Sinkhole Areas and Sinking-Stream Basins, 1997 (1:126,720) - Shows sinkhole areas (SHA) and sinking-stream basins (SSB) associated with rocks of Silurian, Devonian, and Mississippian age in southern Indiana. Shows sinkhole areas larger than 80

[Preview](#) [Metadata](#) [Download](#) [Map Service](#) [Add Layer](#)

### Karst Springs



Springs in South-Central Indiana, 1997 (1:126,720) - Shows the locations of springs in and around the karst region of south-central Indiana. The data should not be used for site-specific data analysis. The layer was compiled from unpublished work maps of Richard L.

[Preview](#) [Metadata](#) [Download](#) [Map Service](#) [Add Layer](#)

# IndianaMap Viewer – Layer Gallery

## KARST\_DYE\_LINES\_IN: Inferred Connections for Selected Subsurface Dye Traces in Southern Indiana (Indiana Geological Survey, 1:24,000, Line Shapefile)

Metadata also available as - [\[Parseable text\]](#)

### Metadata:

- [Identification Information](#)
- [Data Quality Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

---

#### Identification Information:

##### Citation:

##### Citation Information:

*Originator:* Indiana Geological Survey

*Publication Date:* 20020717

*Title:*

KARST\_DYE\_LINES\_IN: Inferred Connections for Selected Subsurface Dye Traces in Southern Indiana (Indiana Geological Survey, 1:24,000, Line Shapefile)

*Geospatial Data Presentation Form:* Vector digital data

*Publication Information:*

*Publication Place:* Bloomington, Indiana

*Publisher:* Indiana Geological Survey

*Online Linkage:* <<http://igs.indiana.edu/arcims/statewide/download.html>>

*Other Citation Details:*

A predecessor of this shapefile (a coverage named DYE\_LINE) was used in the publication of the following map: Frushour, S.S., Harper, D., and Dintaman, C., 2000, Selected subsurface dye traces in south-central Indiana, Indiana Geological Survey, Miscellaneous Map 66.

##### Description:

##### Abstract:

KARST\_DYE\_LINES\_IN is a line shapefile that shows inferred subsurface connections between input and detection points of various dye-trace investigations in southern Indiana. This shapefile should be used in conjunction with an associated shapefile named KARST\_DYE\_PTS\_IN, which shows input, output, and intermediate dye-trace points.

##### Purpose:

KARST\_DYE\_LINES\_IN was derived from a coverage named DYE\_LINE. The purpose of DYE\_LINE was to compile unpublished work maps of Samuel S. Frushour (Indiana Geological Survey) and to bring

Coordination of Indiana GIS through dissemination of data and data products, education and outreach, adoption of standards, and building partnerships



# IndianaMap Viewer

<http://maps.indiana.edu>

IndianaMAP

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Address

Map Viewer

Map Gallery

Layer Gallery

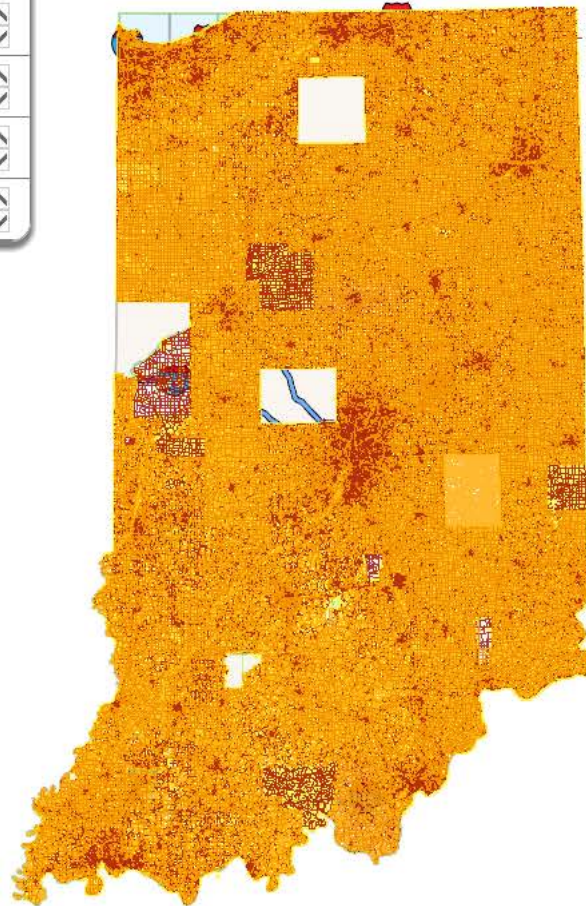
## Active Layers

- ☒ Reference Land Parcels County IDHS
- ☒ Infrastructure Streets Centerlines IDHS
- ☒ Infrastructure Streets Address Points IDHS
- ☒ Government Boundaries Miscellaneous IDHS

## Share Map

**Detailed Link** <http://maps.indiana.edu/in>

**Short Link** <http://bit.ly/1fqTnj5>



1:2500000  
0 20 40mi

# IndianaMap Viewer – Layer Gallery

maps.indiana.edu/arcgis/rest/services/Hydrology/Karst\_Dye\_Lines/MapServer

Phil (5) - Google Wa... Web GIS Stuff SmartView Connect ... OpenTopography P... LAStools: convertin... PCL 1.3.1! - Point Cl... Code for America | ... QR-Code Generator Other bookmarks

**ArcGIS Services Directory**

[Home](#) > [Hydrology](#) > [Karst\\_Dye\\_Lines \(MapServer\)](#) [Help](#) | [API Reference](#)

## Hydrology/Karst\_Dye\_Lines (MapServer)

**View In:** [ArcMap](#) [ArcGIS Explorer](#) [ArcGIS JavaScript](#) [Google Earth](#) [ArcGIS.com Map](#)

**View Footprint In:** [Google Earth](#)

**Service Description:**

**Map Name:** Layers

[Legend](#)

[All Layers and Tables](#)

**Layers:**

- [Karst Area Dye Lines](#) (0)

**Tables:**

**Description:**

**Copyright Text:**

**Spatial Reference:** 26916

**Single Fused Map Cache:** true

**Tile Info:**

- **Height:** 512
- **Width:** 512
- **DPI:** 96
- **Levels of Detail:** (*≠ Levels: 12*)
  - **Level ID:** 0 [[Start Tile](#), [End Tile](#)]  
Resolution: 661.459656252646  
Scale: 2500000

www.arcgis.com/home/webmap/viewer.html?basemapUrl=http%3a%2f%2fmaps.indiana.edu%2fArcGIS%2frest%2fservices%2fHydrology%2fKarst\_Dye\_Lines%2fMapServer&source=sd

Karst\_Dye\_Lines.zip

Show all downloads...



# IndianaMap Services on ArcGIS.com

indianamap.maps.arcgis.com/home/index.html

HOME GALLERY MAP SCENE GROUPS MY CONTENT MY ORGANIZATION

Phil



## IndianaMAP

IndianaMAP

### IndianaMap Gallery



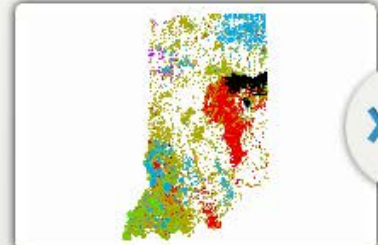
Indiana Oil and Gas Well Map



IndianaMap Data Sharing Initiative Layers: Parcels,



Indiana Bedrock Geologic Map

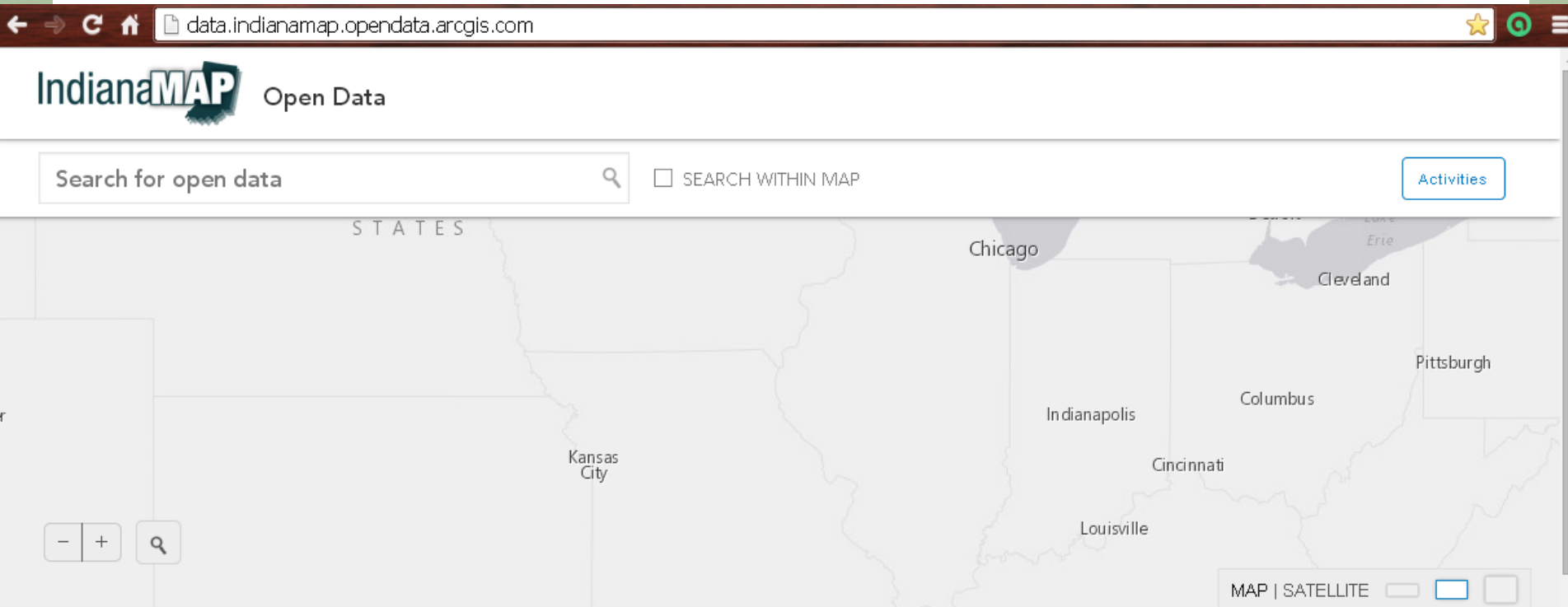


Petroleum\_Wells

**IndianaMAP** is the public source for map data in Indiana. It includes the information people need most in a format that is accessible to both the general public and expert geographic information systems (GIS) users.

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# IndianaMap Open Data Portal (ArcGIS.com)



## IndianaMap Open Data Site - Hosted by the Indiana Geographic Information Council (IGIC) & the Indiana Geological Survey (IGS)

Through our IndianaMap initiatives, IGIC's mission to lead the effective application of geographic information across Indiana and our vision to provide a modern, accurate, documented, and accessible geospatial information infrastructure for Indiana is realized. IndianaMAP is the largest publicly available collection of Indiana geographic information system (GIS) map data. It is made possible by an alliance of partners from federal, state, local organizations and agencies, and universities.

### Recent Data



#### [Congress 112th Districts](#)

Districts for the 112th Congress, 2011 (1:500,000) - Shows congressional districts from

BY HILLRIC MARCH 30, 2015



#### [Boundaries Miscellaneous IDHS](#)

Miscellaneous Government

# The IndianaMap Spatial Data Portal

[gis.iu.edu](#)

[Apps](#)
[100th Annual Purdue ...](#)
[vlogbrothers - YouTube](#)
[Homepage - Skills for t...](#)
[IGIC](#)
[Membership Portal - L...](#)
[Mail :: Welcome to IU ...](#)
[Home - GeoTech Center](#)
[GeoMarketspace](#)
[MundoGEO Webinars](#)
[dotStaff™](#)


**INDIANA UNIVERSITY**

ISDP

IU

Search

GO



View Data

Download Data

Dataset Information

Support & Info

[Home](#) » [Welcome!](#)

## Welcome to gis.iu.edu

The Indiana Spatial Data Portal (ISDP) provides access to more than 30 terabytes of Indiana geospatial data. Most datasets are available to the public for download and have no use restrictions. Indiana University's (IU) high performance networks and computing infrastructure support the ISDP which archives and provides web access to imagery provided by data [partners](#) within and outside IU. To learn more about discovering, downloading and viewing data from the ISDP, see the [ISDP tutorials](#).

Available statewide datasets include aerial photos, topographic maps, LiDAR and elevation data, and Sanborn historic maps. In addition, the ISDP hosts several local datasets for Allen, Bartholomew, Boone, Dearborn, Gibson, Hamilton, Hancock, Hendricks, Johnson, Marion, Monroe, Morgan, Posey, Shelby and Wayne Counties.

This web site connects to Indiana University's [Scholarly Data Archive](#) (SDA) which provides long-term, disaster-tolerant data archival and distribution capabilities to hundreds of terabytes of IU data. The SDA archives data on tapes. When downloading files please be aware that you may experience a short delay (20 seconds to 1 minute) before the download begins. During this time a robotic system is locating and mounting a tape and transferring your file from tape to spinning disk.




**The David C. Ford  
Special Achievement Award**

February 2009



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Powered by the IU WCMS using Site Builder

# IndianaMap.org Web Site

## IndianaMA IndianaMAP

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Search

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data and res

mapping websites

The links below are to interactive mapping sites run by federal, state, and local governments, and regional organizations.

### DATA – Download GIS

- [IndianaMap Layer Gal](#)
- [IndianaMap Open Top](#)
- [Indiana Spatial Data P](#)
- [IndianaView](#)

### GIS RESOURCES – Ac

- [IndianaMap Viewer \(de](#)
- [IndianaMap Map Galle](#)
- [IndianaMap Layer Gal](#)
- [IndianaMap Web Map](#)
- [IndianaMap Web Map](#)
- [IndianaMap ARCGIS.c](#)
- [IndianaView](#)
- [Indiana Geographic In](#)
- [Indiana Coal Mine Info](#)
- [Indiana State Govern](#)
- [Indiana State Govern](#)

### INVENTORY – Find wh

- [Data Inventory \(framev](#)
- [Local Mapping Websit](#)

### Counties

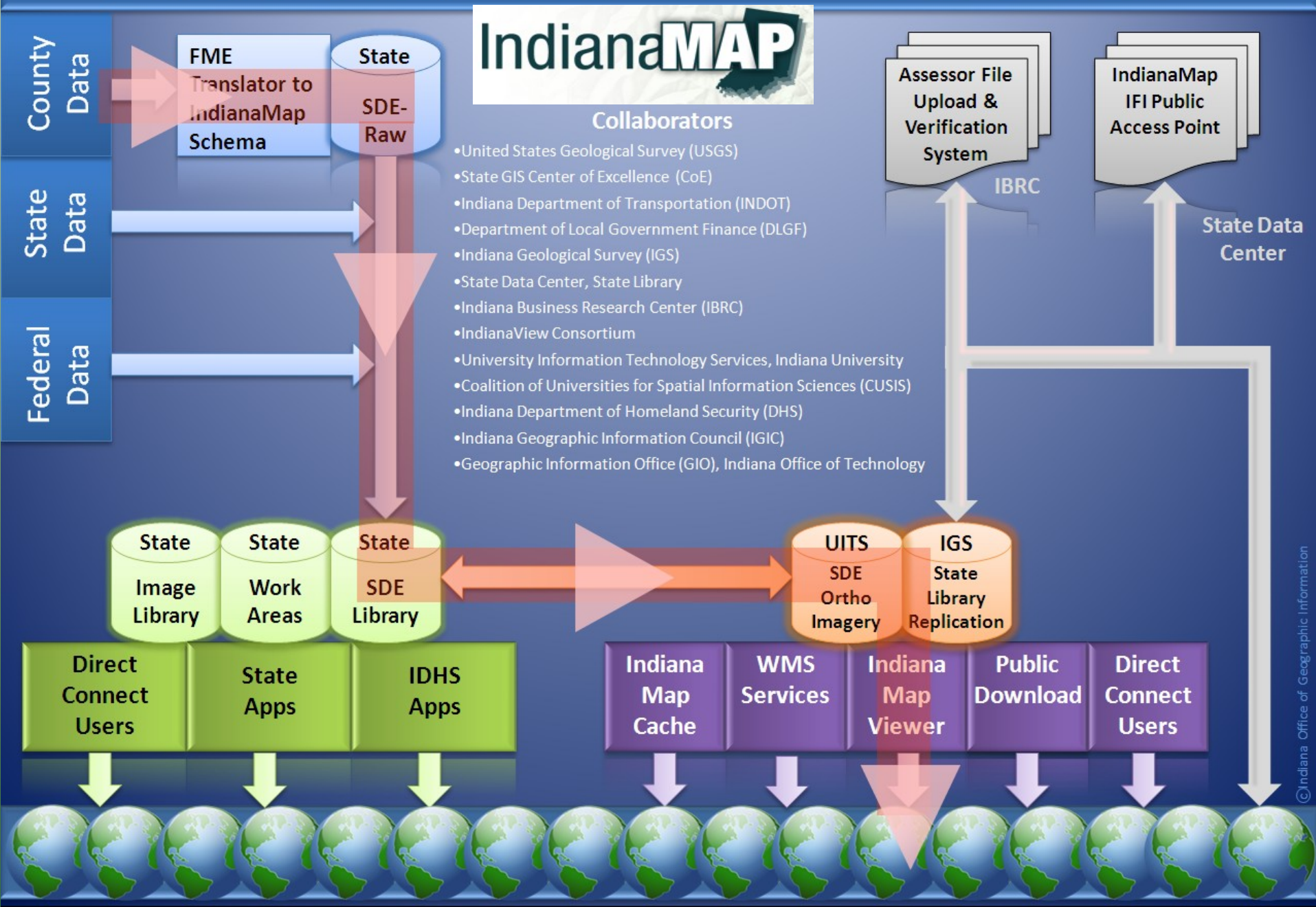
- |                                      |                                     |
|--------------------------------------|-------------------------------------|
| • <a href="#">Adams County</a>       | • <a href="#">LaPorte County</a>    |
| • <a href="#">Allen County</a>       | • <a href="#">Lawrence County</a>   |
| • <a href="#">Bartholomew County</a> | • <a href="#">Madison County</a>    |
| • <a href="#">Benton County</a>      | • <a href="#">Marion County</a>     |
| • <a href="#">Blackford County</a>   | • <a href="#">Marshall County</a>   |
| • <a href="#">Boone County</a>       | • <a href="#">Martin County</a>     |
| • <a href="#">Brown County</a>       | • <a href="#">Miami County</a>      |
| • <a href="#">Cass County</a>        | • <a href="#">Monroe County</a>     |
| • <a href="#">Clay County</a>        | • <a href="#">Morgan County</a>     |
| • <a href="#">Clark County</a>       | • <a href="#">Montgomery County</a> |
| • <a href="#">Clinton County</a>     | • <a href="#">Newton County</a>     |
| • <a href="#">Crawford County</a>    | • <a href="#">Noble County</a>      |
| • <a href="#">DeKalb County</a>      | • <a href="#">Ohio County</a>       |
| • <a href="#">Davies County</a>      | • <a href="#">Orange County</a>     |
| • <a href="#">Dearborn County</a>    | • <a href="#">Owen County</a>       |
| • <a href="#">Decatur County</a>     | • <a href="#">Perry County</a>      |
| • <a href="#">Delaware County</a>    | • <a href="#">Pike County</a>       |
| • <a href="#">Dubois County</a>      | • <a href="#">Porter County</a>     |
| • <a href="#">Elkhart County</a>     | • <a href="#">Posey County</a>      |
| • <a href="#">Fayette County</a>     | • <a href="#">Pulaski County</a>    |
| • <a href="#">Franklin County</a>    | • <a href="#">Randolph County</a>   |
| • <a href="#">Fulton County</a>      | • <a href="#">Ripley County</a>     |
| • <a href="#">Gibson County</a>      | • <a href="#">Rush County</a>       |
| • <a href="#">Grant County</a>       | • <a href="#">Scott County</a>      |
| • <a href="#">Greene County</a>      | • <a href="#">Shelby County</a>     |
| • <a href="#">Hamilton County</a>    | • <a href="#">Spencer County</a>    |
| • <a href="#">Hancock County</a>     | • <a href="#">St. Joseph County</a> |
| • <a href="#">Harrison County</a>    | • <a href="#">Starke County</a>     |

### Statewide

- |   |  |
|---|--|
| • <a href="#">IndianaMap</a>                          | <b>Natural Resources</b>                           |
| • <a href="#">Create a Simple Map of Indiana</a>      | • <a href="#">Land Use &amp; Econ Dev Planning</a> |
| • <a href="#">Indiana Spatial Data Portal</a>         | • <a href="#">Active Mine Permits</a>              |
| <b>Imagery</b>  | • <a href="#">Petroleum Maps</a>                   |
| • <a href="#">Orthophotography</a>                    | • <a href="#">Soil Maps</a>                        |
| • <a href="#">Elevation Data</a>                      | • <a href="#">Kudzu Map</a>                        |
| • <a href="#">USGS Elevation Benchmarks</a>           | • <a href="#">Emerald Ash Borer Quarantine</a>     |
| • <a href="#">Topography</a>                          | • <a href="#">DNR Wildlife Biologists</a>          |
| • <a href="#">Stats Indiana</a>                       | • <a href="#">DNR District Foresters</a>           |
| • <a href="#">Satellite Imagery</a>                   | • <a href="#">DNR Law Enforcement Districts</a>    |
| <b>Historical Data</b>                                | <b>Waters</b>                                      |
| • <a href="#">Historical Aerial Photo Index</a>       | • <a href="#">Indiana Floodplain Portal</a>        |
| • <a href="#">Historical County Boundaries</a>        | • <a href="#">HYMAPS (HYdrologic MAP Server)</a>   |
| • <a href="#">Historic Structures Inventory</a>       | • <a href="#">Great Lakes Basin Map</a>            |
| <b>Recreation</b>                                     | • <a href="#">Watershed Delineator</a>             |
| • <a href="#">What's Happening in My County?</a>      | • <a href="#">Hydrological Impact Analysis</a>     |
| • <a href="#">Where to Hunt</a>                       | • <a href="#">Water Wells</a>                      |
| • <a href="#">Where to Fish</a>                       | • <a href="#">Enhanced Water Wells Viewer</a>      |
| • <a href="#">Indiana Trails Inventory</a>            | • <a href="#">Water Quality Atlas</a>              |
| • <a href="#">Natural Resources Recreation Finder</a> | <b>Transportation</b>                              |
| <b>Government Services</b>                            | • <a href="#">Statewide Road Conditions</a>        |
| • <a href="#">Who's Your Legislator?</a>              | • <a href="#">INDOT District Map</a>               |
| • <a href="#">FSSA Office Locator</a>                 | • <a href="#">INDOT Benchmark Locator</a>          |
| • <a href="#">Sex Offender Registry</a>               | • <a href="#">Rail Crossing Locator</a>            |
| • <a href="#">Equal Employment Opportunities</a>      | • <a href="#">Interchange Study of 2007</a>        |
|   | • <a href="#">Traffic Counts</a>                   |



# IndianaMap Integration & Distribution







# The IndianaMap County Data Sharing Initiative

All 92 Indiana Counties are participating, contributing:

4,870 Government Boundaries

603,132 Street Centerlines

3,630,775 Parcels

3,191,230 Address Points

County_Government_Boundaries_IDHS_IN_June2015				
OBJECTID	Shape	SOURCE_DATASETID	SOURCE_DATASEC	SOURCE
1	Polygon	F26_12	Civil Townships	Adams Coi
2	Polygon	F44_1	Voter District	Adams Coi
3	Polygon	F44_2	Voter District	Adams Coi
4	Polygon	F44_3	Voter District	Adams Coi
5	Polygon	F44_4	Voter District	Adams Coi
6	Polygon	F44_5	Voter District	Adams Coi
7	Polygon	F44_6	Voter District	Adams Coi
8	Polygon	F44_6	Voter District	Adams Coi
9	Polygon	F44_7	Voter District	Adams Coi
10	Polygon	F44_8	Voter District	Adams Coi
11	Polygon	F44_9	Voter District	Adams Coi
12	Polygon	F44_10	Voter District	Adams Coi
13	Polygon	F44_10	Voter District	Adams Coi

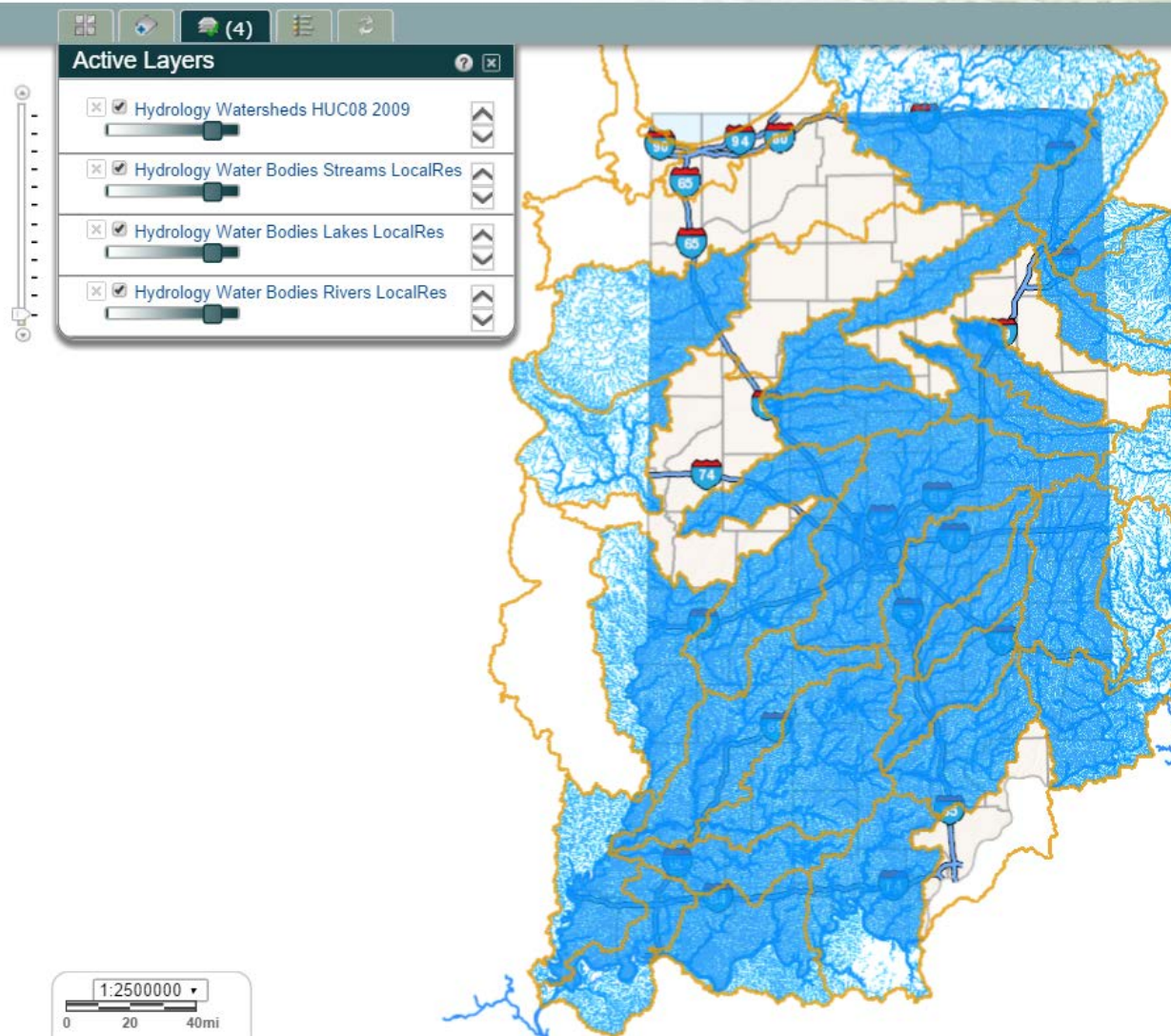
County_Land_Parcels_IDHS_IN_June2015				
OBJECTID	Shape	PERMANENT_IDENTIFIER	SOURCE_DATASEC	SOURCE
1	Polygon	01-05-35-200-001-000-020	Parcels	Adams
2	Polygon	01-05-26-300-004-000-020	Parcels	Adams
3	Polygon	01-05-200-002-000-020	Parcels	Adams
4	Polygon	01-05-26-400-001-000-020	Parcels	Adams
5	Polygon	01-05-26-400-003-000-020	Parcels	Adams
6	Polygon	01-05-35-200-008-000-020	Parcels	Adams
7	Polygon	01-05-35-200-007-000-020	Parcels	Adams
8	Polygon	01-05-35-200-004-000-020	Parcels	Adams
9	Polygon	01-05-36-100-002-000-020	Parcels	Adams
10	Polygon	01-05-35-201-003-002-020	Parcels	Adams
11	Polygon	01-05-36-100-003-000-020	Parcels	Adams
12	Polygon	01-05-36-100-008-000-020	Parcels	Adams
13	Polygon	01-05-36-100-001-000-020	Parcels	Adams

County_Street_Centerlines_IDHS_June2015				
OBJECTID	Shape	CURRENT_STATU	FULL_STREET_NAME	HIGH_AC
1	Polyline	0	BRYAN ST	498
2	Polyline	0	BOLLMAN ST	399
3	Polyline	0	W BUTCHER ST	398
4	Polyline	0	E 700 S	4249
5	Polyline	0	S 350 E	4998
6	Polyline	0	NUTTMAN AVE	499
7	Polyline	0	S 300 W	495
8	Polyline	32	<Null>	<Null>
9	Polyline	0	S 550 E	499
10	Polyline	32	<Null>	<Null>
11	Polyline	0	W WAYNE LN	150
12	Polyline	0	LINE ST	499
13	Polyline	0	E 1300 N	600

County_Address_Points_IDHS_IN_June2015			
SOURCE_ORIGINATOR	LOADDATE	FULL_ADDRESS	ADDRESS_NUMBE
Adams County	2/27/2015	11966 N 550 W	11990
Adams County	2/27/2015	1850 W 1200 N	0
Adams County	2/27/2015	690 E 900 N	750
Adams County	2/27/2015	7455 N PIQUA RD	0
Adams County	2/27/2015	2590 W 750 N	2585
Adams County	2/27/2015	5909 N 450 W	5904
Adams County	2/27/2015	2505 N PIQUA RD	0
Adams County	2/27/2015	3320 N PIQUA RD	3300
Adams County	2/27/2015	6246 W 300 N	6300
Adams County	2/27/2015	356 W 300 N	0
Adams County	2/27/2015	2505 N SALEM RD	2515
Adams County	2/27/2015	2423 N 400 W	2403

# Improving Indiana's NHD

## IndianaMAP



**IndianaMap**

<http://bit.ly/1pqurk4>

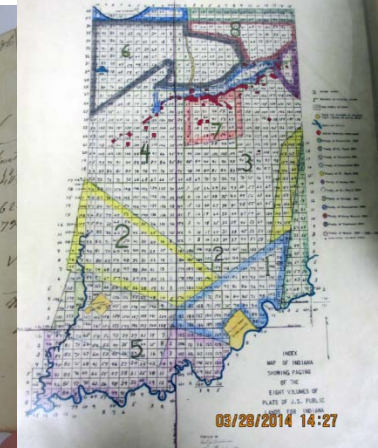
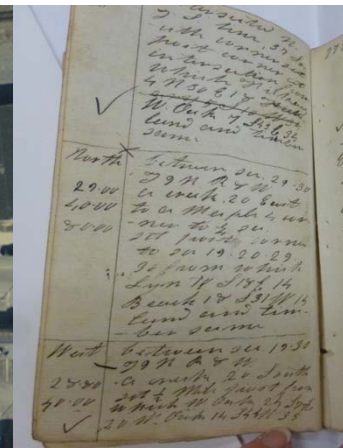
**SwipeMap**

<http://arcg.is/1HHmzQa>



# Remembering our Past!

- Preserving Indiana Historic Imagery Archives [INDOT]
- Preserving Historic Sanborn Maps
- Preserving Indiana's Original Surveying Records - Government Land Records Office [GLO] Records




<http://www.igic.org/category/committees/education-outreach/>

# The Indiana OpenTopography Server

opentopo.sdsc.edu/gridsphere/gridsphere?gs\_action=lidarDataset&cid=geonlidarframeportlet&opentopoID=OTLAS.062012.4326.1

Select Data Product: Point Cloud Download & Processing | Raster [West] | Raster [East] | Point Cloud Bulk Download (Requires log-in)

1a. Select area of data to download or process: ?



Horizontal Coordinates: WGS84 [EPSG: 4326] - Vertical Coordinates: North American Vertical Datum 1988 (NAVD88)

Data Selection Coordinates: ☐ Manually enter selection coordinates (in the horizontal coordinate system listed above)

1b. Choose Return Classification: ? ☐ Ground ☐ Unclassified ☒ All

1c. Choose an Output Coordinate System: ?

- NAD83 UTM Zone 16N (Meter) [EPSG: 32616]
- NAD83 Indiana East (ftUS) [EPSG: 2965]**
- NAD83 Indiana West (ftUS) [EPSG: 2966]
- NAD83 UTM Zone 16N (Meter) [EPSG: 32616]

2. Point Cloud Data Download: **\*\* Note \*\***



# The Open Topography Server for Indiana



<http://bit.ly/Xwy86P>



# **Introduction to IndianaMap Resources and LiDAR**

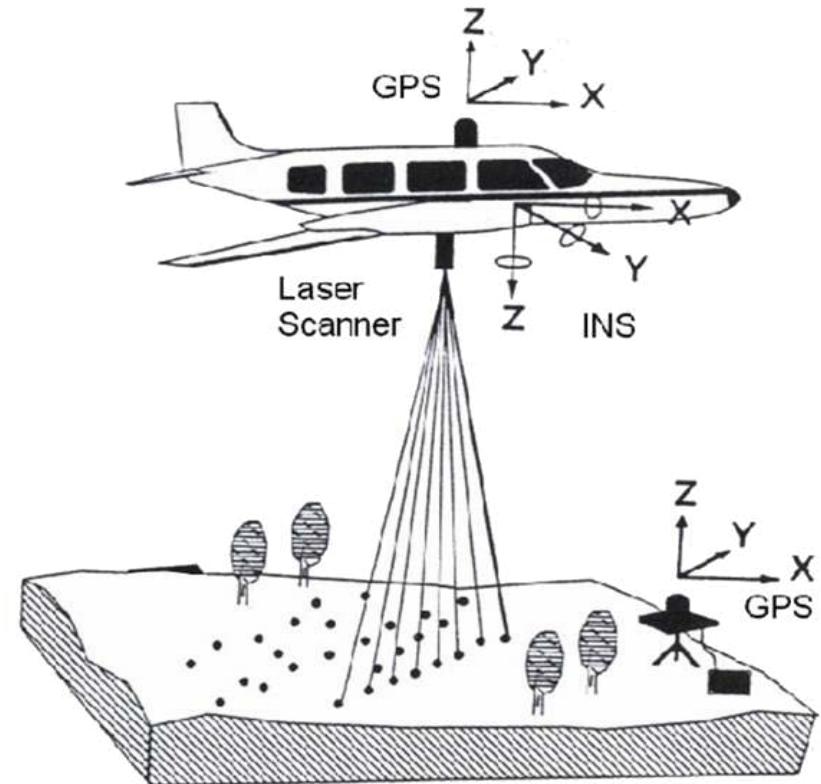
## **Introduction to LiDAR**

(Light Detection and Ranging)



LiDAR acquisition involves precise timing and calibration of several instruments.

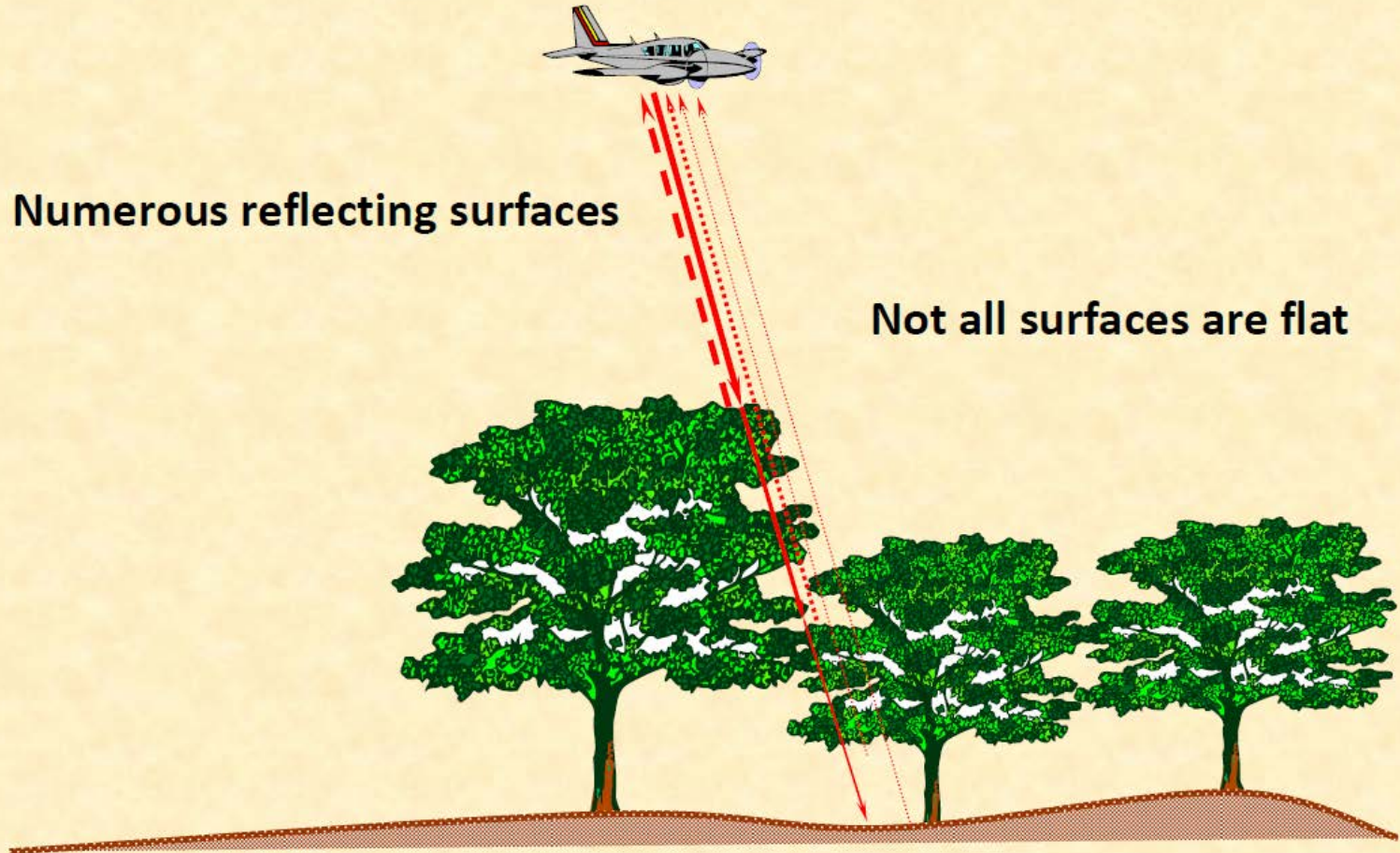
- λ ABGPS data is differentially corrected to solve for final position
- λ IMU data is used to determine sensor orientation
- λ Laser scanner sub-systems record range and direction of ground points.
- λ All of these instruments must be properly calibrated to ensure quality point cloud data is obtained



## LiDAR data capture

Numerous reflecting surfaces

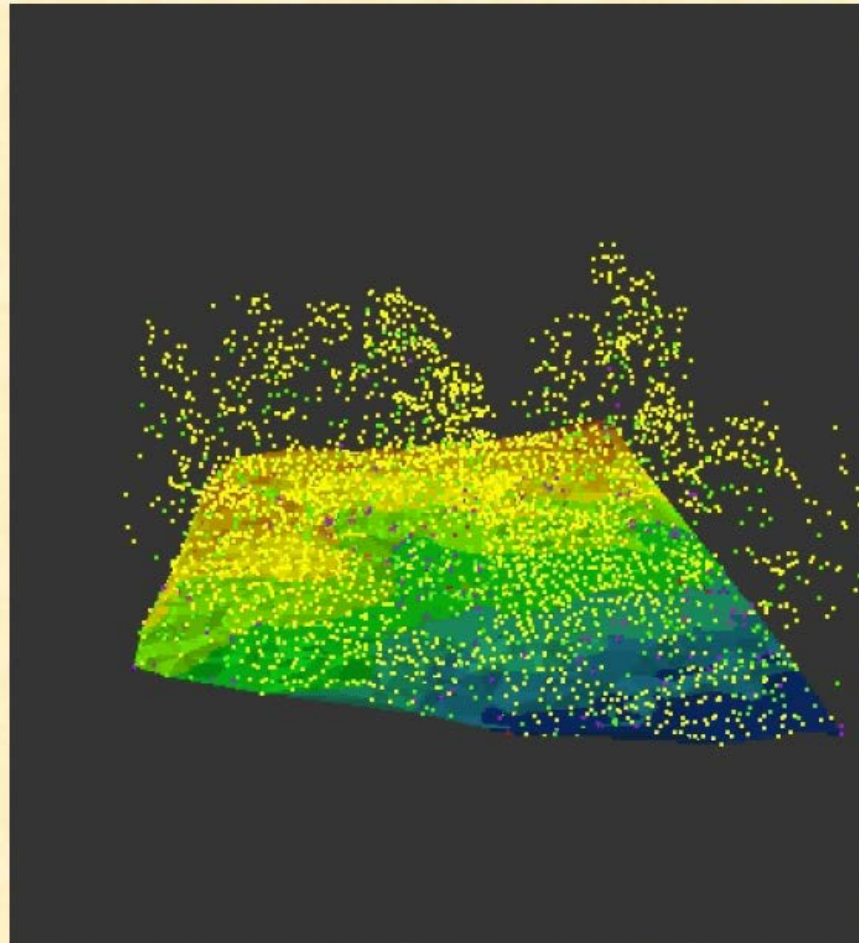
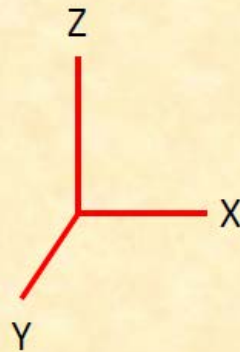
Not all surfaces are flat



Intergraph

# Introduction to LiDAR

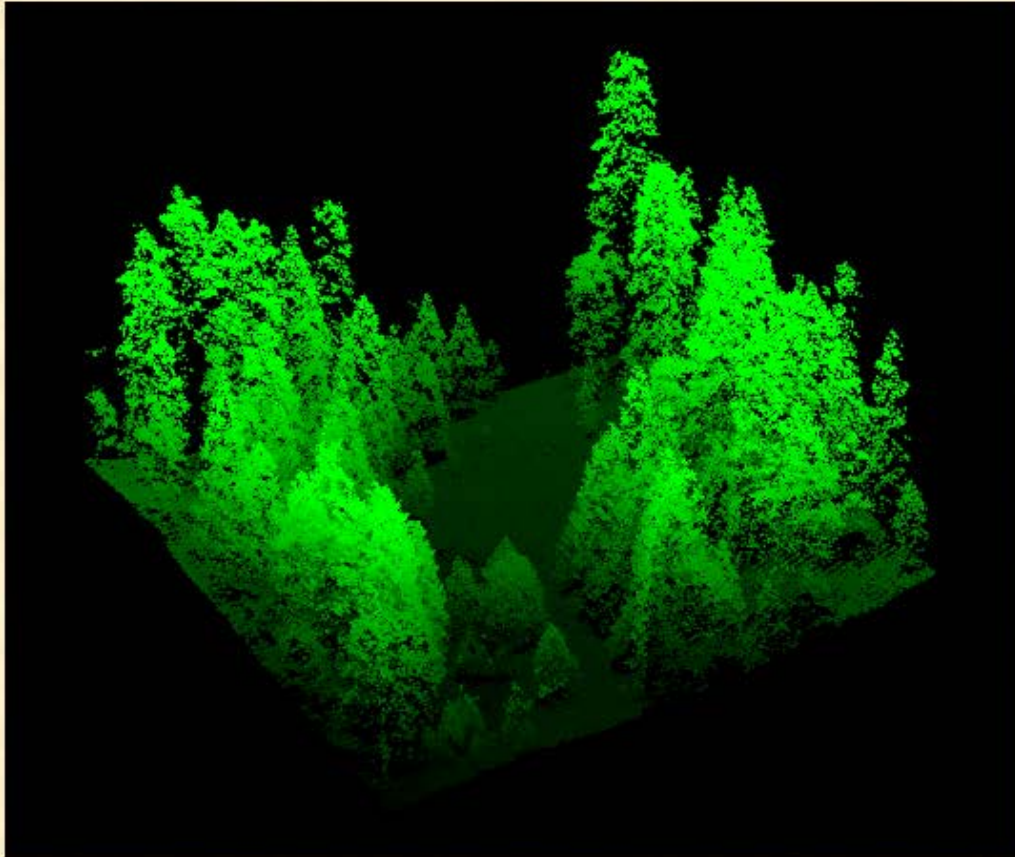
**Point cloud = a collection of points  
with x, y, and z coordinates**



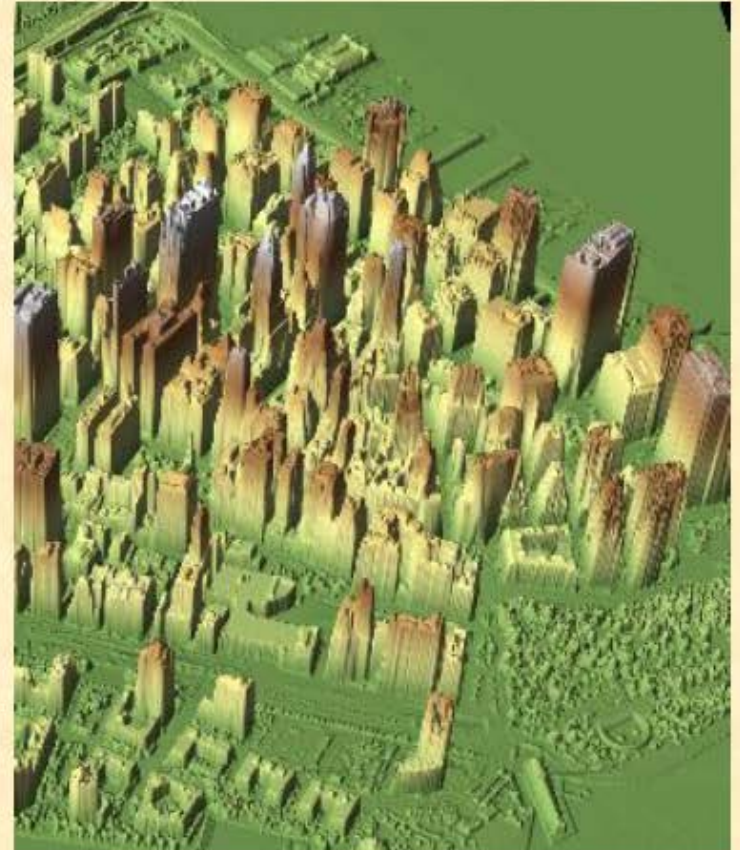


# Introduction to LiDAR

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UC Davis





## What is a Digital Elevation Model?

- λ Digital Elevation Models are regularly gridded (continuous) elevations interpolated from discrete mass points and break-lines.
- λ Digital Elevation Models are commonly derived from airborne LiDAR data.



# Introduction to LiDAR

Bare-earth DEM generation from LiDAR data requires multiple processing steps.

- λ The LiDAR point cloud must be filtered to identify ground and non-ground points.
- λ The bare-earth points do not properly model hydrologic features.
- λ Break-lines are added to develop a final DEM that can be used for hydrologic modeling.

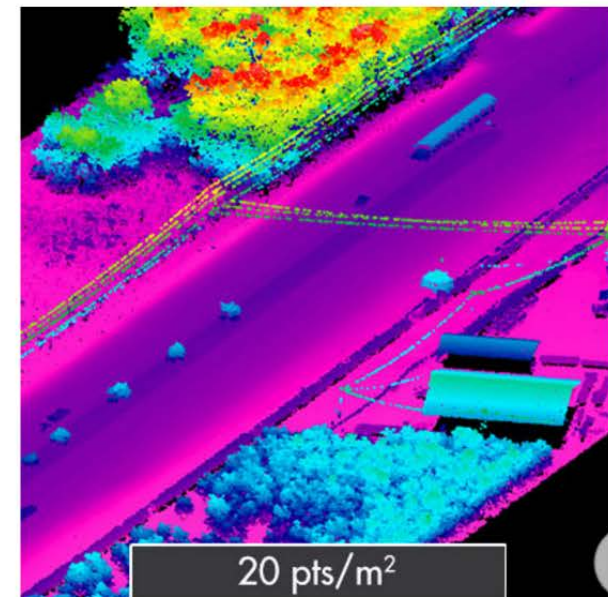
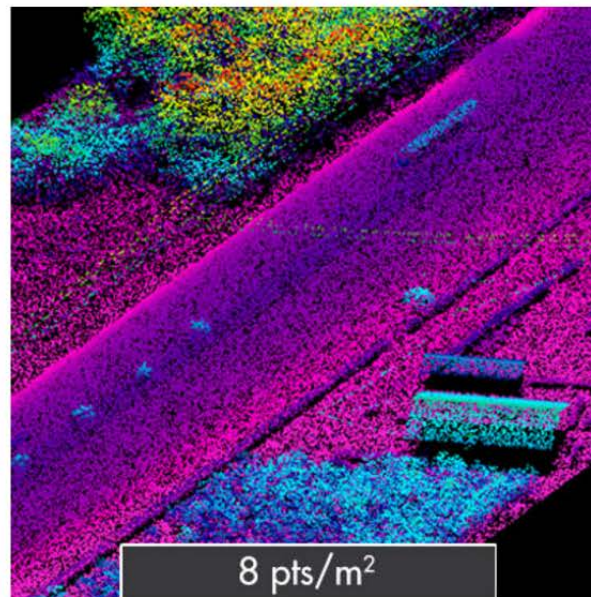
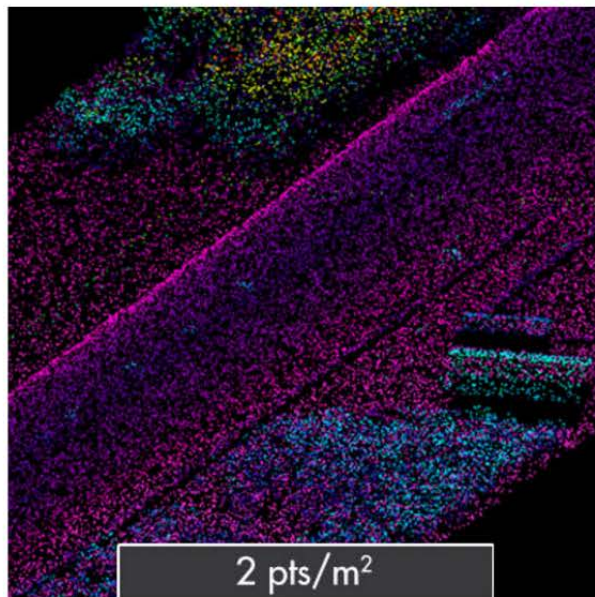




## Emerging 3D Technologies

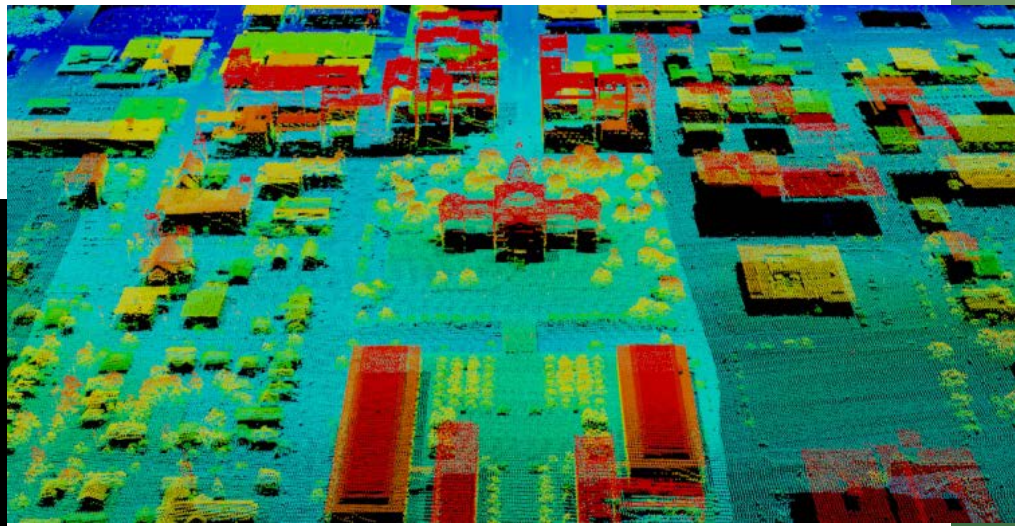
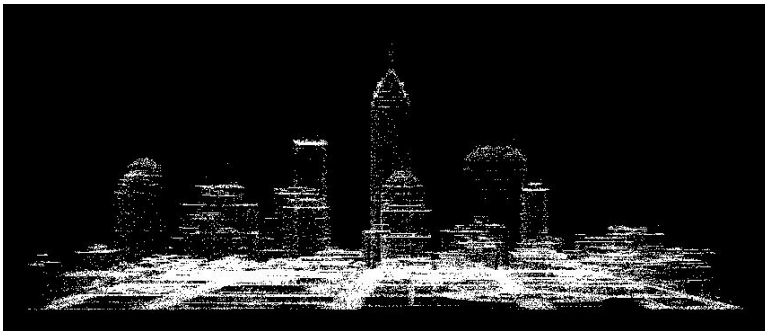
**Single Photon Lidar – Sigma Space (Hexagon)**

**Geiger Mode Lidar – HARRIS Corp., Intelliearth**

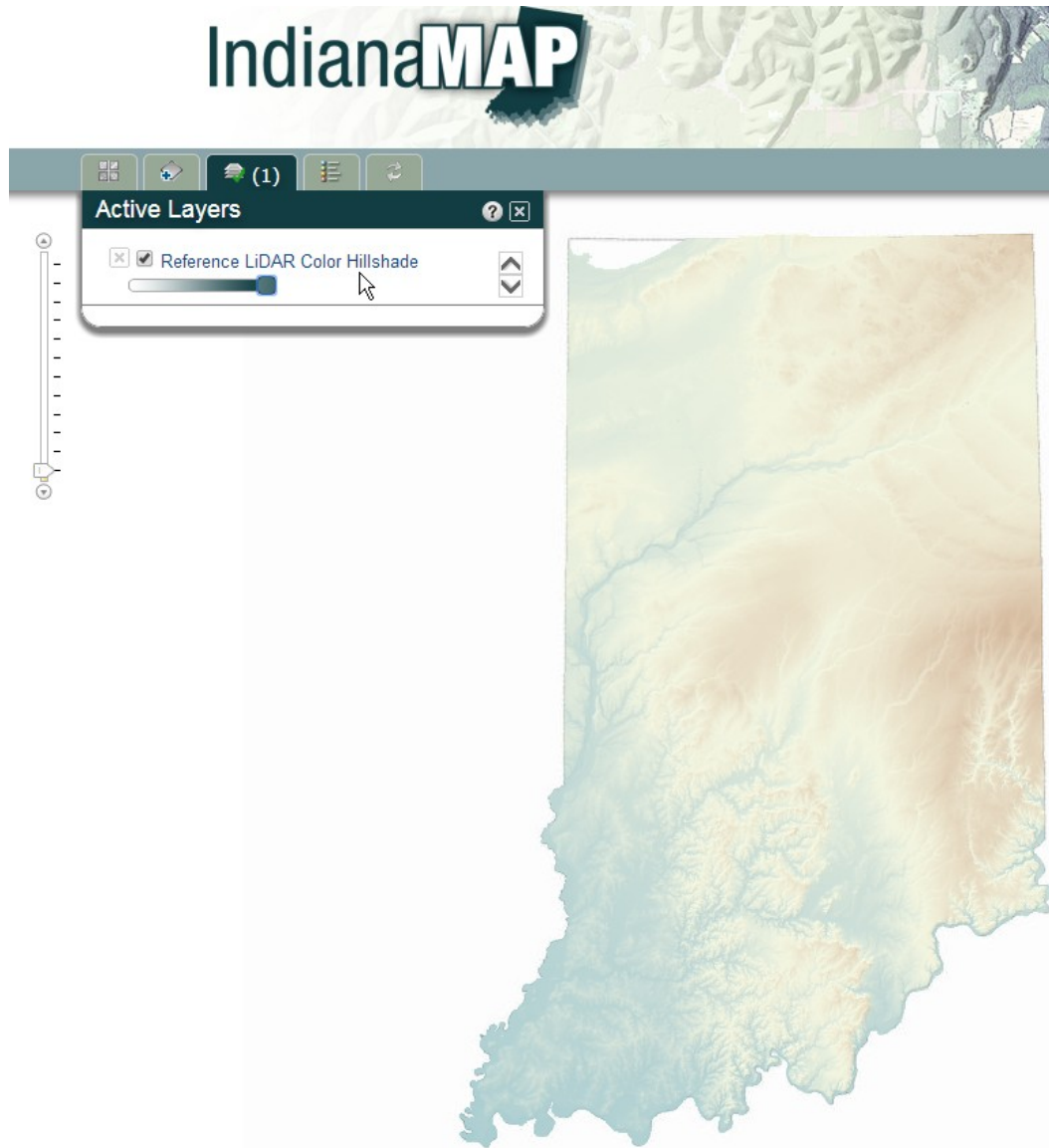


# Indiana's current LiDAR holdings

- Filtered raw LiDAR data (point clouds) in LAS v1.2 format
- LiDAR bare earth data, first, last return data, intensity in LAS v1.2 format
- Hydro Breaklines in ESRI format
- Hydro Flattened DEM data delivered in ERDAS Imagine .IMG
- 5,000 X 5,000 tiles



# LiDAR Hillshade from 2011 -2013 Program



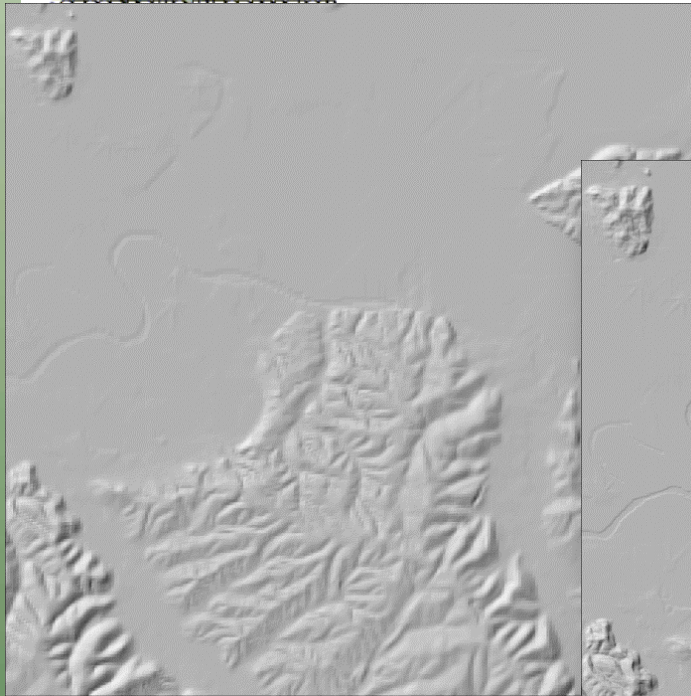
<http://bit.ly/1gokPKH>



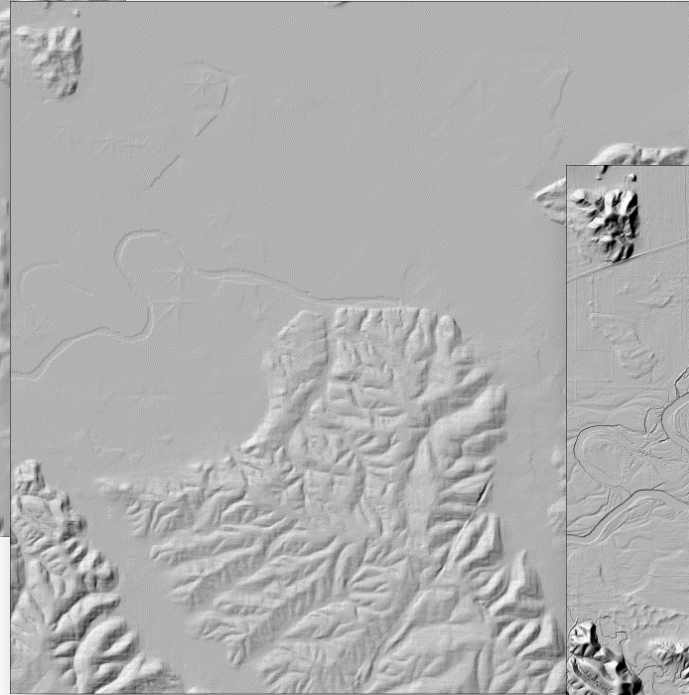


## **LiDAR**

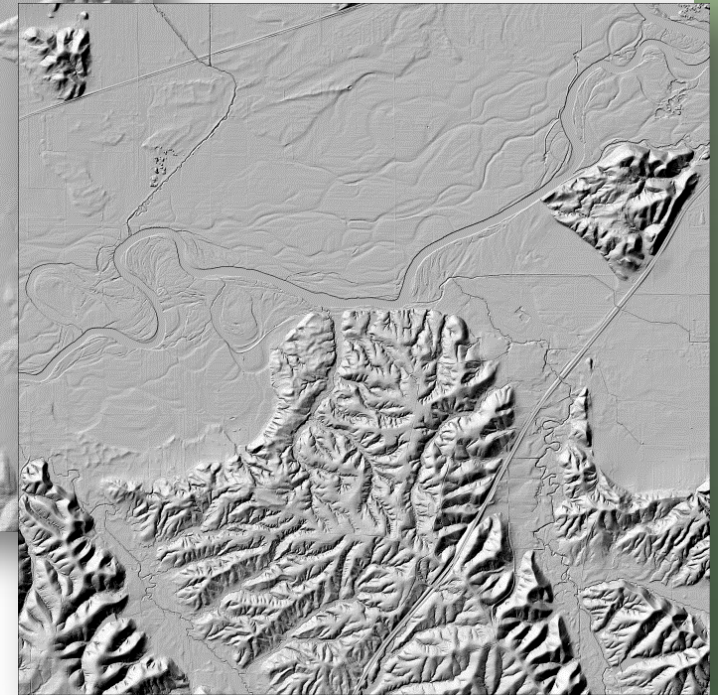
# Improvements in resolution



30 m DEM



10 m DEM



1.5 m DEM

SW of Martinsville, Indiana

Slide Courtesy of Todd Thompson @ Indiana Geological Survey



# + USGS 3D Elevation Program (3DEP) FY16 Broad Agency Announcement (BAA)

## Project Selection In Progress

30

- 41 proposals submitted for projects in 29 states + 1 territory
- Total project value of \$36M; \$21M in partner contributions, requesting \$15M 3DEP funding
- Coverage proposed 142,000 sq mi
- BAA remains open to new proposals through the year

